ASSE Standard #1052-2016

ASSE Board Approved: May 3, 2016
ANSI Approved: June 6, 2016

ASSE International

Performance Requirements for

Hose Connection Backflow Preventers

An American National Standard

General Information

No product may be said to be listed by ASSE unless the manufacturer has applied to ASSE International, has had its product tested according to the applicable standards, and when the product has passed the test, displays the ASSE Seal on the product.

Instructions for receiving the authorization to display the seal are available from the ASSE International office. Organizations wishing to adopt or list any ASSE standard should print the ASSE standard number on the cover page first and in equal or larger type to that of the adopting or listing organization.

ASSE International
Mokena, Illinois

Foreword

This foreword shall not be considered a part of the standard. However, it is offered to provide background information.

ASSE standards are developed in the interest of consumer safety. ASSE International is dedicated to the preservation of public health and safety through its guiding principle, “Prevention Rather Than Cure.”

Preventing the contamination of potable water in plumbing systems is a major objective of ASSE’s Standards Program. ASSE has addressed the need for backflow protection at hose threaded outlets, where attaching a common garden hose or utility hose may expose users to highly dangerous conditions. Hose threaded protective devices shall only be used on systems where the low-head backpressure does not exceed that generated by an elevated hose equal to or less than 10 feet (3.0 m) in height.

ASSE 1011, Performance Requirements for Hose Connection Vacuum Breakers, covers devices containing a single check valve and an atmospheric vent valve. This standard, ASSE 1052, focuses on devices containing two check valves, which are known as hose connection backflow preventers. Backsiphonage and backpressure protection are achieved by adding the safety factor of a second check valve to the protection already provided by ASSE 1011 – the single check hose bibb vacuum breaker.

The two check device:
- Meets the ASSE definition of a backflow prevention device;
- Provides protection against the high hazard conditions of backsiphonage and low-head backpressure; and
- Allows a field test to be performed.

It is essential that regular inspection and maintenance of backflow prevention devices be conducted in order to ensure that the devices are continuously in working condition to prevent backflow.

This standard is part of the “vacuum breaker group,” which includes:
- ASSE 1001, *Performance Requirements for Atmospheric Type Vacuum Breakers*;
- ASSE 1004, *Backflow Prevention Requirements for Commercial Dishwashing Machines*;
- ASSE 1011, *Performance Requirements for Hose Connection Vacuum Breakers*; and
- ASSE 1052, *Performance Requirements for Hose Connection Backflow Preventers*.

Not all devices are appropriate in all cases. On the next page, in Table A, there is a reference chart whereby the reader can find the most suitable standard for his or her needs.

TABLE A

ASSE Standard Number	Standard Name	Typical Use	Highlights	Types Within the Standard
1001	Atmospheric Type Vacuum Breakers	• Faucet with hose thread spout • Water closet fill valve	• Prevents backsiphonage: - Have its outlet open to atmosphere; - Not be subjected to backpressure; - Not be subjected to more than 12 hours of continuous water pressure	• Atmospheric type • Check valve member and an air vent that is normally closed when the device is pressurized
1004	Backflow Prevention for Commercial Dishwashers	Commercial dishwashers	• Prevent backsiphonage at high temperatures • No direct contact with washing fluid	• Air gap per ASME A112.1.3 • Atmospheric vacuum breaker per ASSE 1001 • Hose connection vacuum breaker per ASSE 1011 • Hose connection backflow preventer per ASSE 1052
1011	Hose Connection Vacuum Breakers	Hose connections, such as hose bibb, wall hydrant, yard hydrant	• Prevents backflow by use of a SINGLE CHECK valve • Prevents backsiphonage by use of AIR PORTS • Prevents backpressure by use of check valve, and relief of backpressure through air ports. i.e. relieves pressure in the hose. • Device is non removable and non-testable	Only one type
1052	Hose Connection Backflow Preventers	Hose connections, such as hose bibb, wall hydrant, yard hydrant	• Same as a 1011 device, except there are two check valves. One check valve holds the pressure in the hose. The Intermediate chamber between the check vales becomes atmospheric. • Device is non removable but is testable.	Only one type

TABLE B

Standard No.	Single Check	Dual Check	Air Ports	Backflow	Backsiphonage	Backpressure	Frost-Free	Removable	Testable	High Hazard
1001	N	N	Y	N	Y	N	N	N	N	Y
1004	ASME A112.1.3 air gap, ASSE 1001, 1011, or 1052 device is installed as a sub-assembly for backflow protection.									
1011	Y	N	Y	Y	Y	Y	N	N	N	Y
1052	N	Y	Y	Y	Y	Y	N	N	N	Y

ASSE International's Standards Program systematically evaluates new technologies through formal requests, and addresses the development and promulgation of performance standards, which are designed to safeguard public health and safety.

ASSE considers product performance standards to be of great value in the development of improved plumbing systems for the protection of public health and safety.

The ASSE International Product Standards Committee encourages manufacturers to participate in the development of performance requirement standards and testing procedures for their products. These standards have the consensus of manufacturers and others who have pertinent interests in plumbing systems, and are acceptable to this organization.

Although many of the material specifications are detailed within Section IV of this Standards, it is the responsibility of the manufacturer to comply with the requirements of the Safe Drinking Water Act, United States Public Law 93-523.

The ASSE 1052 Working Group, which developed this standard revision, was set up within the framework of the ASSE International Product Standards Committee.

Recognition is made of the time volunteered by members of this working group and of the support of manufacturers, who also participated in meetings for this standard.

This standard does not imply ASSE International's endorsement of a product that conforms to these requirements. Compliance with this standard does not imply acceptance by any code body.

Plumbing codes mandate how and where these devices are installed. However, this standard was promulgated using a specific set of installation requirements and conditions for the purpose of providing reasonable performance requirements and compliance testing.

It is recommended that these devices be installed, consistent with local codes, by qualified and trained professionals.

This standard was promulgated in accordance with procedures developed by the American National Standards Institute (ANSI).

This edition of the standard was approved by the ASSE International Board of Directors on May 3, 2016 as an ASSE standard.

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Performance Requirements for
Hose Connection Backflow Preventers

Section I

1.0 General

1.1 Application

This standard establishes design requirements, basic performance requirements and test procedures for hose connection backflow preventers (herein referred to as the "device"). This device is designed to be installed on the discharge side of a hose threaded outlet on a potable water system. This two-check device protects against backflow, due to backsiphonage or low-head backpressure, and is field testable to certify protection under the high-hazard conditions present at a hose threaded outlet. This device shall only be used on systems where there is low-head backpressure that does not exceed that generated by an elevated hose equal to or less than 10 feet (3.0 m) in height.

This device shall not be subjected to more than 12 hours of continuous water pressure.

1.2 Scope

1.2.1 Description

A hose connection backflow preventer shall consist of two independent checks, force loaded or biased to a closed position, with an atmospheric vent located between the two check valves, which is force loaded or biased to an open position, and a means for attaching a hose.

1.2.2 Size Range

The device shall have male hose threaded outlets sized ½ NPHS, ¾ NPHS or 1 NPHS. Hose threads shall conform to Standard ANSI/ASME B1.20.7. Inlets with hose threads shall be provided with a non-removable feature.

1.2.3 Pressure Range

The devices shall operate at pressures from 0 psi (0 kPa) to 125.0 psi (861.9 kPa).

1.2.4 Temperature Range

The devices shall operate at temperatures from 33.0 °F (0.6 °C) to 140.0 °F (60.0 °C).

1.2.5 Repairability

Devices shall be repairable.

1.3 Reference Standards

Reference to industry standards shall be the latest edition of the standards.

Section II

2.0 Test Specimens

2.1 Samples Submitted for Test

Three (3) devices of each size and model shall be submitted by the manufacturer. Tests shall be performed in the order listed on one (1) device of each size submitted.

2.2 Samples Tested

The testing agency shall select one (1) of each size and model for the full test.

2.3 Drawings

Assembly drawings and other data that is necessary to enable a testing agency to determine compliance with this standard, together with installation drawings, shall accompany devices when submitted for examination and performance tests under this standard.

2.4 Rejection

Failure of one (1) device shall be cause for rejection of that size and model until the manufacturer has corrected the fault and submitted new devices for testing.

Section III

3.0 Performance Requirements and Compliance Testing

3.1 Hydrostatic Test of Complete Device

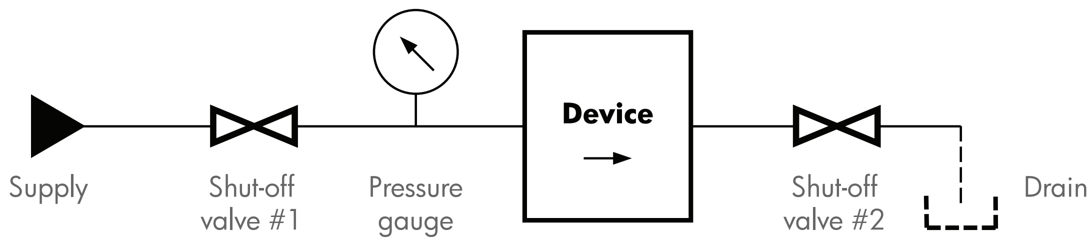
3.1.1 Purpose

The purpose of this test is to determine if the device withstands a pressure of 250.0 psi (1724 kPa) or two (2) times the manufacturer's maximum rated working pressure, whichever is greater.

3.1.2 Procedure

The device shall be installed in the open position on the test system, as shown in Figure 1, with the inlet connected to an ambient water supply and the throttling valve #2 open. The device shall be purged of air, and the throttling valve #2 closed. The device shall be pressurized to 250 psi (1724 kPa) or two (2) times the manufacturer's maximum rated working pressure, whichever is greater. The pressure shall be held for not less than five (5) minutes.

Figure 1



3.1.3 Criteria

Any indication of external leakage shall result in the rejection of the device.

3.2 Water Flow Capacity and Pressure Loss

3.2.1 Purpose

The purpose of this test is to determine the pressure losses at various flow rates.

Table 1
Flow Rate and Pressure Loss

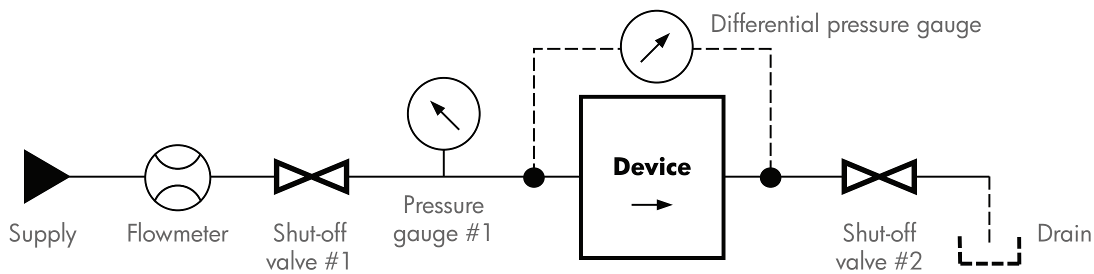
Inlet Size of Device	Minimum Flow Rate		Maximum Allowable Pressure Loss	
NPS	GPM	L/s	psi	kPa
½	3.0	(0.19)	25.0	(172)
¾	4.0	(0.25)	25.0	(172)
1	8.0	(0.50)	25.0	(172)

3.2.2 Procedure

The device shall be installed, as shown in Figure 2, in a test system equipped with means for accurately measuring the flow rate and pressure loss across the device.

After purging the system of air, close throttling valve #2. Throttling valve #2 shall then be opened slowly until the 25.0 psi (172 kPa) pressure differential is reached.

Figure 2



3.2.3 Criteria

Failure to meet the maximum allowable pressure loss requirements in Table 1 shall result in a rejection of the device.

3.3 Deterioration at Maximum Rated Temperature and Pressure

3.3.1 Purpose

The purpose of this test is to determine if the device continues to function without leakage when exposed to the maximum rated temperature and pressure.

3.3.2 Procedure

Install the device per Figure 2. Water at a temperature of 140.0 °F ± 5.0 °F (60.0 °C ± 2.8°C) or the manufacturer's maximum rated temperature, whichever is greater, at a pressure of 125.0 psi (861.9 kPa) or the manufacturer's maximum rated pressure, whichever is greater, shall be circulated at a flow rate, per Table 1, through the device for eight (8) hours per day for a total of ten (10) days.

3.3.3 Criteria

Any indication of external leakage shall result in a rejection of the device.

3.4 Life Cycle Test

3.4.1 Purpose

The purpose of this test is to determine if there is any deterioration of performance upon completion of five thousand (5,000) cycles.

3.4.2 Procedure

Install the device, as shown in Figure 1, with ambient water at the manufacturer's maximum rated working pressure applied to the inlet. The device shall be cycled using a solenoid valve upstream of the device, and the outlet open to the atmosphere. The device shall be subjected for five thousand (5,000) cycles. Cycling of the solenoid valve shall not exceed thirty (30) cycles per minute.

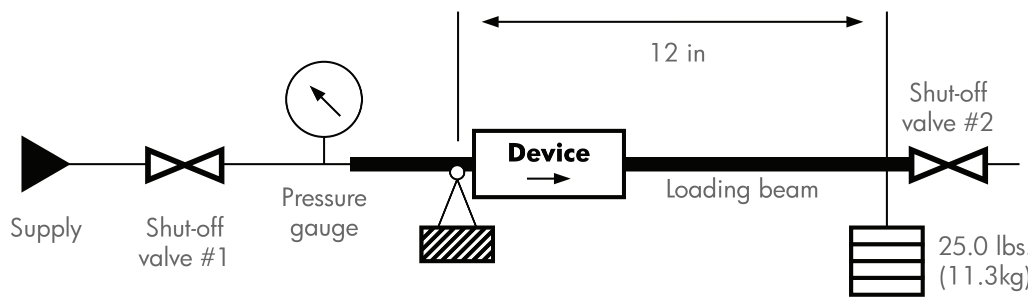
3.4.3 Criteria
Deterioration of performance that prevents compliance with the remaining sections of this standard shall result in a rejection of the device.

3.5 Resistance to Bending

3.5.1 Purpose
The purpose of this test is to determine if the device continues to function without leakage when subjected to a moment[1] of 25 ft-lbf (34 N-m), per Figure 3.

3.5.2 Procedure
With the device installed, as shown in Figure 3, apply a load in a direction at right angles to the axis through the hose connections at the outlet of the device and hold for not less than three (3) minutes. The load shall be applied at a distance to create a torque of 25 ft-lbf (e.g. 25 lbf (110 N) at 12 in (31cm)). During the test, the device shall be pressurized to not less than 125.0 psi (861.9 kPa).

Figure 3



3.5.3 Criteria
Any visible external leaks during the test shall result in a rejection of the device.

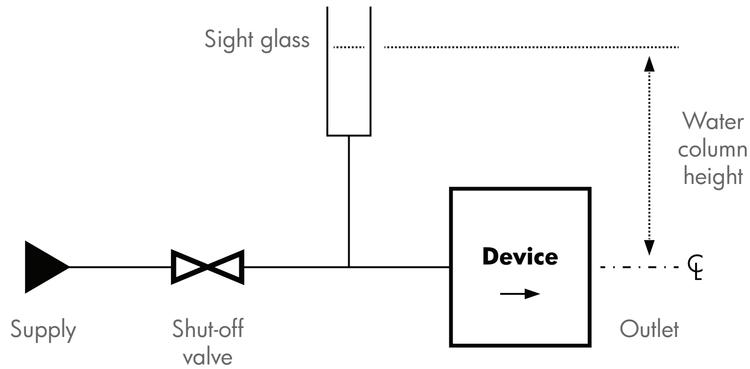
3.6 Tightness of Outlet Check Valve

3.6.1 Purpose
The purpose of this test is to determine that the outlet check valve is drip-tight when a pressure of not less than 1.0 psi (6.9 kPa) is applied to the upstream side with atmospheric pressure on the downstream side.

3.6.2 Procedure
Install the device, as shown in Figure 4, with a vertical sight glass installed upstream of the device inlet. Block open the inlet check valve and seal the atmospheric vents closed. With the outlet pressure at atmospheric, purge the device of air, then gradually raise the inlet pressure until there is flow from the outlet of the device, filling the sight glass of a water column of not less than 42.0 inches (1070 mm), as measured from the centerline of the pipe or the center of the check valve. Close the supply valve. Hold for not less than five (5) minutes.

[1] For reference, this moment is the same as a large pull of 100 lbf (440 N) on a connected hose perpendicular to the outlet of the device 3.0 in (76 mm) away.

Figure 4



3.6.3 Criteria
Any loss of level in the sight glass below 28.0 inches (711 mm) of water, as measured from the centerline of the pipe or the center of the check valve, shall result in a rejection of the device.

3.7 Tightness of Inlet Check Valve

3.7.1 Purpose
The purpose of this test is to determine that the inlet check valve is drip-tight when a pressure of not less than 1.0 psi (6.9 kPa) is applied to the upstream side with atmospheric pressure on the downstream side.

3.7.2 Procedure
Install the device, as shown in Figure 4, with a vertical sight glass installed upstream of the device inlet. Block open the outlet check valve and seal the atmospheric vents closed. With the outlet pressure at atmospheric, purge the device of air, then gradually raise the inlet pressure until there is flow from the outlet of the device, filling the sight glass to a water column of not less than 42.0 inches (1070 mm), as measured from the centerline of the pipe or the center of the check valve. Close the supply valve. Hold for not less than five (5) minutes.

3.7.3 Criteria
Any loss of level in the sight glass below 28.0 inches (711 mm) of water, as measured from the centerline of the pipe or the center of the check valve, shall result in a rejection of the device.

3.8 Leakage from Vent Ports

3.8.1 Purpose
The purpose of this test is to determine if there is leakage from the atmospheric vents.

3.8.2 Procedure
The device shall be installed on the test system, as shown in Figure 1. Throttling valve #2 shall be closed. The supply valve shall be opened and the inlet pressure shall be raised to the point at which leakage from the vent ports ceases. During this procedure, observe the point at which the highest rate of discharge occurs. Adjust the inlet pressure to this point and measure the rate of leakage flow.

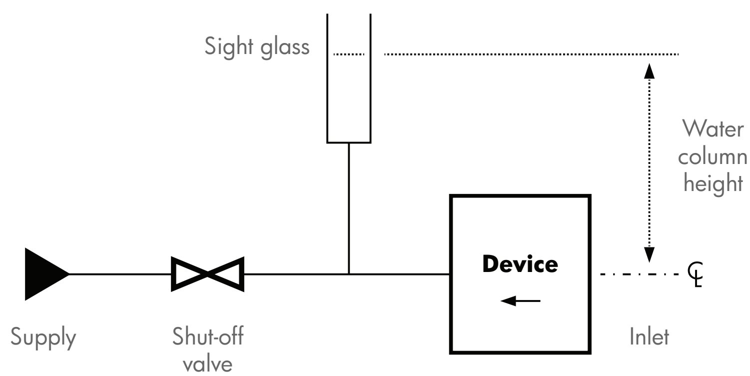
3.8.3 Criteria
A flow rate exceeding 4.0 ounces (120 mL) per minute below 3.0 psi (20.7 kPa) shall result in a rejection of the device. Leakage at, or above, 3.0 psi (20.7 kPa) shall result in a rejection of the device.

3.9 Backflow Through Inlet Check Valve

3.9.1 Purpose
The purpose of this test is to determine if there is backflow of water through the inlet check valve when the atmospheric vents are sealed closed, the outlet check valve is held open and pressure is applied to the outlet of the device.

3.9.2 Procedure
Block open the outlet check valve and seal the atmospheric vents closed. Install the device, as shown in Figure 5. Open the supply valve to raise the water level in the sight glass to 6.0 inches (150 mm) above the centerline of the outlet check valve, then close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass. Open the supply valve to raise the water level in the sight glass to 10.0 feet (3.00 m) above the centerline of the outlet check valve, then close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass.

Figure 5



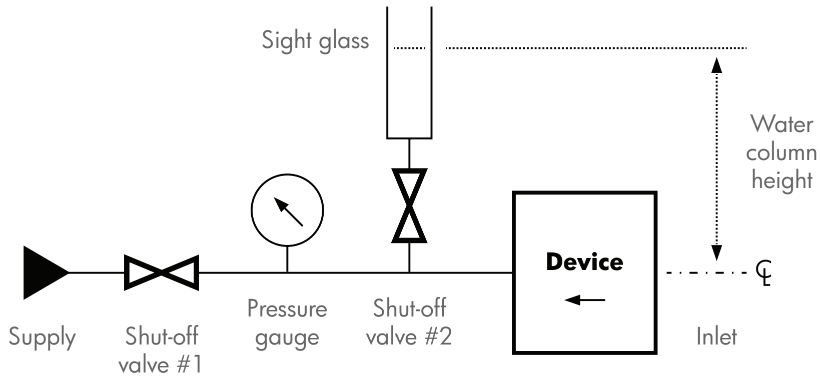
3.9.3 Criteria
Any loss of level in the sight glass or leakage through the inlet check valve shall result in a rejection of the device.

3.10 Backflow Through Outlet Check Valve

3.10.1 Purpose
The purpose of this test is to determine if there is backflow of water into the inlet of the device when respective pressures of 6.0 inches (150 mm) of water column, 10.0 feet (3.00 m) of water column and a working pressure of at least 125.0 psi (861.9 kPa) or the manufacturer's maximum rated working pressure, whichever is greater, are applied to the outlet of the device.

3.10.2 Procedure
Install the device as shown in Figure 6, and open valves #1 and #2. Raise the water level in the sight glass to 6.0 inches (150 mm) above the centerline of the outlet check valve. Close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass. Open the supply valve to raise the water level in the sight glass to 10.0 feet (3.00 m) above the centerline of the inlet check valve, then close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass. Close valve #2 and raise the supply pressure to at least 125.0 psi (861.9 kPa) or the manufacturer's maximum rated working pressure. Hold for five (5) minutes while observing for leakage at the atmospheric vents.

Figure 6



3.10.3 Criteria

Any loss of level in the sight glass or leakage through the outlet check valve at the atmospheric vents shall result in a rejection of the device.

3.11 Backsiphonage

3.11.1 Purpose

The purpose of this test is to determine if there is backsiphonage of water from the downstream piping into the supply line when both check valves become fouled, and a vacuum is created at the inlet of the device when the downstream pressure is atmospheric.

3.11.2 Procedure

Both the inlet and outlet check valves shall be fouled with a 0.032 inch (0.81 mm) wire, as shown in Figure 7. Install the device, as shown in Figure 8, with a sight glass of ½ inch (12.7 mm) internal diameter. Apply the following vacuum loads in sequence:

1) Apply and hold a vacuum of 25.0 inches (635 mm) of mercury for five (5) minutes.
2) Raise the vacuum slowly from 0 inches (0 mm) to 25.0 inches (635 mm) of mercury, and then slowly reduce it to 0 inches (0 mm) of mercury.
3) Create a surge effect by opening and closing the quick acting valve. The applied vacuum shall be between 0 inches (0 mm) to 25.0 inches (635 mm) of mercury during the test.

Figure 7

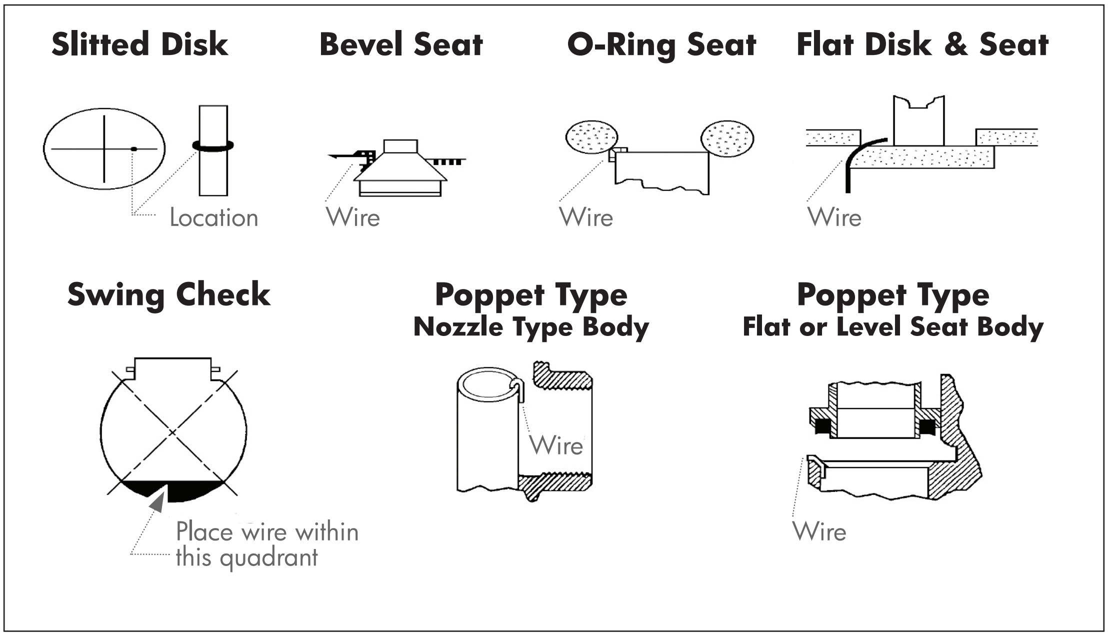
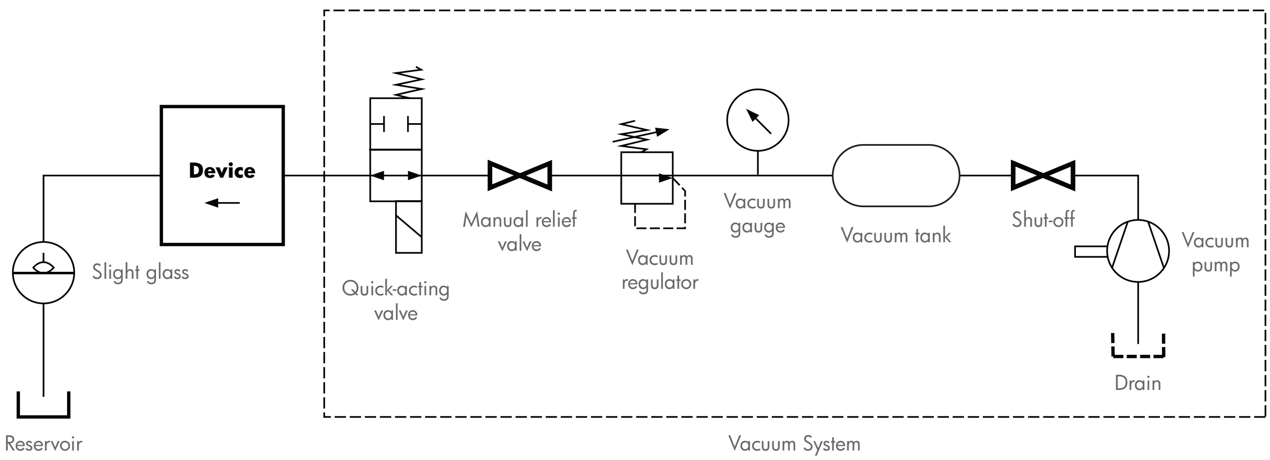


Figure 8



Note: Pump down vacuum tank, then shut off connection to vacuum pump.

3.11.3 Criteria

Any rise of water in the sight glass shall result in a rejection of the device. In any test where there is an upward bowing of the meniscus of the water in the sight glass, the crown of the meniscus shall not exceed a rise of ⅛ inch (3.2 mm) above the level of the water in the reservoir.

3.12 Backsiphonage and Backpressure

3.12.1 Purpose

The purpose of this test is to determine if there is backsiphonage of water from the downstream piping into the supply line when one check valve becomes fouled, and a vacuum is created at the inlet of the device when there is positive pressure on the outlet.

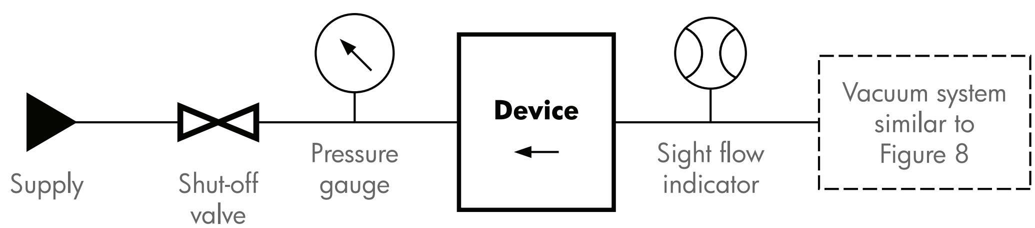
3.12.2 Procedure

Install the device, as shown in Figure 9, with the inlet check valve fouled with a 0.032 inch (0.81 mm) wire in accordance with Figure 7, and the outlet check valve in its normal closed position. Open the supply valve to maintain 3.0 psi (21 kPa) at the outlet of the device. Apply the following vacuum loads in sequence:

1) Apply and hold a vacuum of 25.0 inches (635 mm) of mercury for five (5) minutes,
2) Raise the vacuum slowly from 0 inches (0 mm) to 25.0 inches (635 mm) of mercury, and then slowly reduce it to 0 inches (0 mm) of mercury.
3) Create a surge effect by opening and closing the quick acting valve. The applied vacuum shall be between 0 inches (0 mm) to 25.0 inches (635 mm) of mercury during the test.

Repeat the test with the outlet check valve fouled, in accordance with Figure 7, and the inlet check valve in a closed position.

Figure 9



3.12.3 Criteria

Any indication of flow of water from the outlet of the device into the inlet piping shall result in a rejection of the device.

3.13 Relief of Intermediate Chamber Pressure

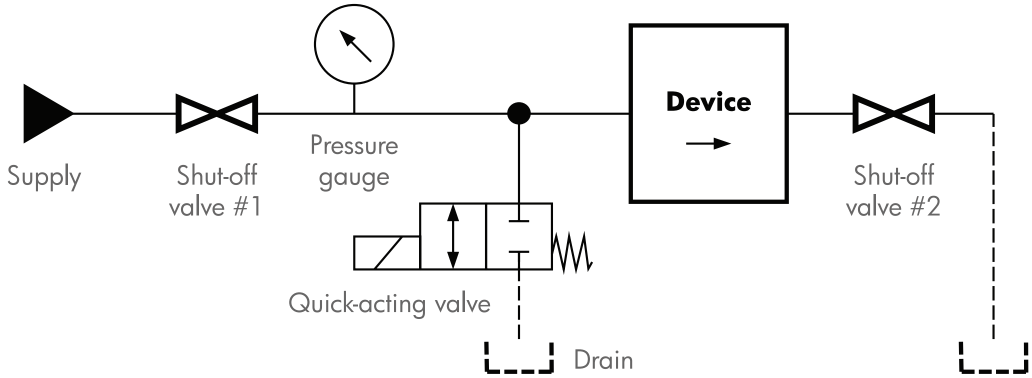
3.13.1 Purpose

The purpose of this test is to determine that when the device is pressurized to 125.0 psi (861.9 kPa) or the manufacturer’s maximum rated working pressure, whichever is greater, and the inlet pressure suddenly drops to zero (0), the intermediate chamber pressure is relieved through the atmospheric vents.

3.13.2 Procedure

Install the device, as shown in Figure 10. Open valves #1 and #2 and flow water through the device to purge it of air. Close valve #2 and raise the pressure to 125.0 psi (861.9 kPa) or the manufacturer’s maximum rated working pressure, whichever is greater. Close valve #1. Open the quick acting valve to drop the pressure at the inlet of the device to atmospheric pressure. The pressure in the intermediate chamber shall be dissipated by the discharge of water through the atmospheric vents.

Figure 10



3.13.3 Criteria

Failure of the atmospheric vents to open shall result in a rejection of the device.

3.14 Non-Removable Feature

3.14.1 Purpose

The purpose of this test is to demonstrate that the removal of the device shall result in damage to the hose threaded connection so that a hose cannot be reattached.

3.14.2 Procedure

Install the device per the manufacturer's instructions. Remove the device by applying a torque at the base of the hose bibb/device interface. Verify that the hose cannot be reattached.

3.14.3 Criteria

Removal of the device without damage to the hose threaded connection shall result in a rejection of the device.

Section IV

4.0 Detailed Requirements

4.1 Materials

Solder and fluxes containing lead in excess of 0.2% shall not be used in contact with potable water. Metal alloys in contact with potable water shall not exceed 8% lead.

4.1.1 Metallic Parts

Metal parts, except springs, in contact with water flowing through the device shall have a corrosion resistance at least equal to a copper alloy of not less than 58% copper.

4.1.2 Springs

Springs shall have a corrosion resistance at least equal to chrome nickel 300-series stainless steel.

4.1.3 Atmospheric Vent Ports

The atmospheric vent ports shall be a non-standard plumbing size. The ports shall not be threaded.

4.1.4 Metal to Metal Seating

Metal to metal seating of check valves and atmospheric vents is prohibited. The seat, the valve disc, or both, shall be made of non-metallic materials that shall provide pressure tight seating and reseating.

4.2 Instructions for Markings

4.2.1 Markings

Each device shall have the following information marked on it where it is visible after the device has been installed:

(a) Name or trademark of manufacturer
(b) Model number

4.2.2 The markings shall be cast, etched, stamped or engraved on the body of the device, or on a brass or stainless steel plate securely attached to the device with a corrosive resistant means.

4.3 Installation Instructions

Complete installation instructions shall be packaged with the device. The instructions shall include installation limitations, field test procedures for testing the downstream check valve with backpressure equivalent to a 10.0 feet (3.0 m) column of water, and for testing the opening of the atmospheric vent. Installation shall be in accordance with manufacturer's recommendations and local code requirements.

4.4 Repair Instructions

Maintenance and repair instructions shall be furnished with the repair parts.

Section V

5.0 Definitions

Definitions in the standard shall take precedence over any other publication. Definitions not shown are found in the Plumbing Dictionary (Sixth Edition) published by ASSE International.

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